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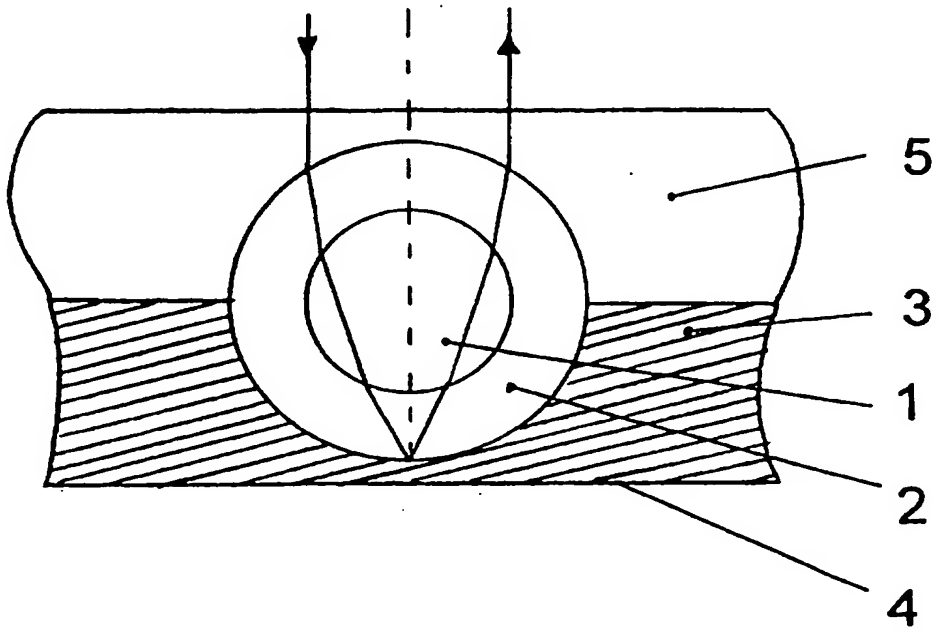
(54) Title: SPHERICAL BEADS FOR LIGHT RETRO-REFLECTIVE APPLICATIONS AND METHOD OF PREPARING SUCH BEADS



(57) Abstract

The invention relates to a method of preparing spherical beads for light retro-reflective applications, where the beads are coated with a transparent distance layer and possibly a light reflective coating. The invention also relates to a spherical bead (1) for use in light retro-reflective applications, where said bead is coated with a transparent distance layer (2) and possibly a light retro-reflective material (6).

Spherical beads for light retro-reflective applications and method of preparing such beads

The present invention relates to spherical beads for light retro-reflective applications and a method for preparing such beads. More specifically, the invention relates to a controlled coating of optical glass beads for the use in combination with different types of substrate materials, such as foils, metals, textiles, paper, etc.

Within the technical field of retro-reflection, there is common practice to use glass beads of different refractive indexes as light refractive elements. In many applications, it is essential that the light refractive element is placed at an exact distance with respect to a reflecting surface. The distance between the outer surface of the glass bead and the light reflecting layer is commonly defined as the space layer or the distance layer. Having space layers of well defined thickness is of great importance, as the bead may be enveloped by different polymer materials that will limit the relation between the refractive indexes in the glass bead and the polymer material. For instance, if the embedding medium is air having a refractive index of 1,0, the use of a space layer should normally not be necessary. Polymers have a refractive index of approx. 1,3 to approx. 1,7 necessitating a space layer when combined with the most common types of glass, if an acceptable focus of the light rays on the reflector should be obtained.

One traditional way of obtaining a space layer on the back side of a mono-layer of glass beads, is to apply a layer of polymer materials such as transparent lacquers, polymeric melts etc. Meanwhile, the resulting space layer provided according to said method may often vary both with respect to the thickness and how the layer actually embeds the beads. If the layer embeds the beads in an insufficient manner, then the retro-reflective properties will be very poor especially at sharp angles of incidence.

The invention as claimed is intended to remedy these drawbacks. It solves the problem of how to obtain an accurate space layer between the bead and the reflecting material. Further, according to the invention good reflective properties may be obtained at very

where in addition a nozzle is placed. From the nozzle a polymeric solution or dispersion is atomised to tiny droplets. The droplets are carried by the gas stream together with the glass beads. The droplets have approximately the same speed as the glass beads, and they are substantially smaller. As these particles are carried upwards the atomised droplets precipitates onto the glass beads. When all droplets have precipitated onto the glass beads, these fall down to the bottom of the vessel where the process starts again and is then repeated until the preferred coating layer is achieved. The coating will therefore consist of numerous small droplets altogether forming a continuous layer or film spherically surrounding the glass bead, where said layer may dry and harden in the run of the process.

In a similar manner, a light reflective layer can be applied to the beads. Such layers may typically consist of a polymeric coating with metallic pigments, and may comprise resin, aluminium flakes, crosslinker, catalyst, solvent and flow additive.

Preferably, the coated beads with the surrounding layer or film are treated for instance thermally in the succeeding application process, the film thus forming a homogenous and perfect spherical shape. This contributes to give the coated beads very promising optical properties.

Figure 1 shows a spherical bead 1 coated with a transparent layer 2. The coated bead may form part of a mono layer of plural beads (not shown) that is partly embedded in a reflective layer 3 carried by a substrate 4. On top of the mono layer of spherical beads a transparent layer 5 can be applied. Such transparent layer can be applied by using rollers or preferably by means of coil coating and if so the transparent layer is made by a polymer coating. Alternatively, the layer may be applied by means of foil, or possibly by a powder coating system. Polymer coatings typically comprises resin, solvents, crosslinker, catalyst and flow additive. Said transparent layer is smooth and is intended to provide satisfactory surface properties to the finished product. It might be coloured and may consist of several layers. Also a polymeric foil laminated to the layer of spherical beads can be employed as a top layer.

Figure 2 shows a spherical bead 1 coated with a transparent layer 2 together with a reflective layer 6 that partly covers the bead. In this example, the bead is embedded in

Claims

1. A method of preparing spherical beads, such as glass beads, for light retro-reflective applications
characterized in that each spherical bead is coated with a transparent layer, that acts as a distance layer between the surface of the bead and the surface of a light reflective material.

2. A method according to claim 1,
characterized in that the distance layer is built up to have a thickness (t) within the range $d/10 < t < 3d$, where (d) is the diameter of the bead.

3. A method according to claim 1-2,
characterized in that the bead is coated with a light reflective material.

4. A method according to claim 3,
characterized in that the light reflective material on the surface of the spherical beads is partly removed by mechanical, chemical or thermal means.

5. A method according to claim 1-4,
characterized in that the spherical beads are coated by being subjected to an air or gas stream containing droplets of the coating that are sprayed into the gas stream by a nozzle, whereby the droplets adhere successively to the beads.

6. A spherical bead, such as a glass bead, for use in light retro-reflective applications,
characterized in that the bead (1) is coated with a transparent layer, such as a polymer, that acts as a distance layer (2) between the surface of the bead and the surface of a light reflective material (6).

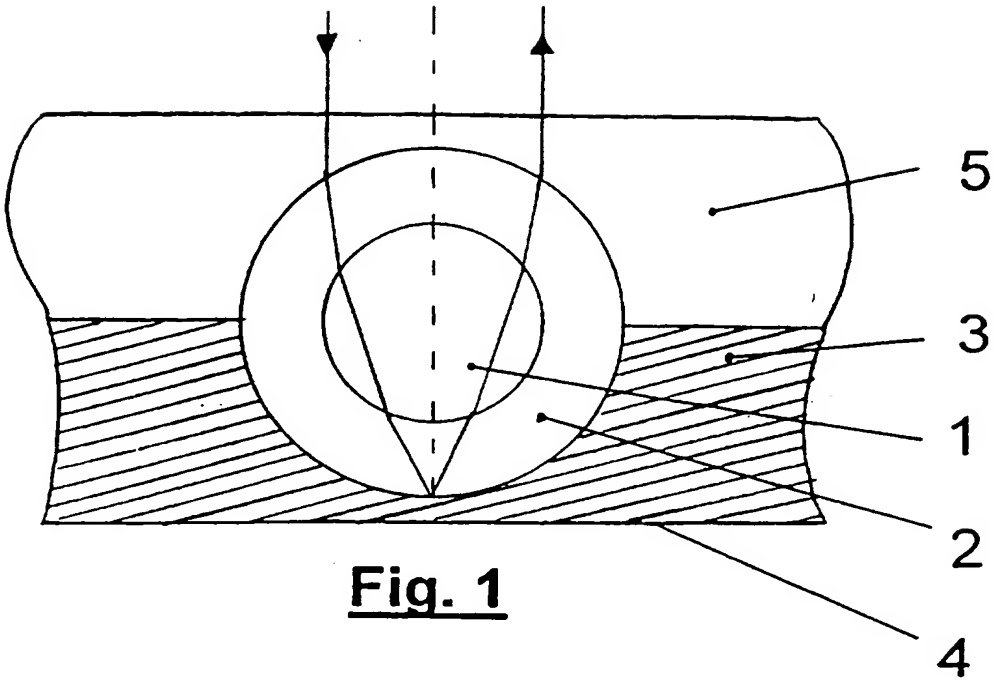


Fig. 1

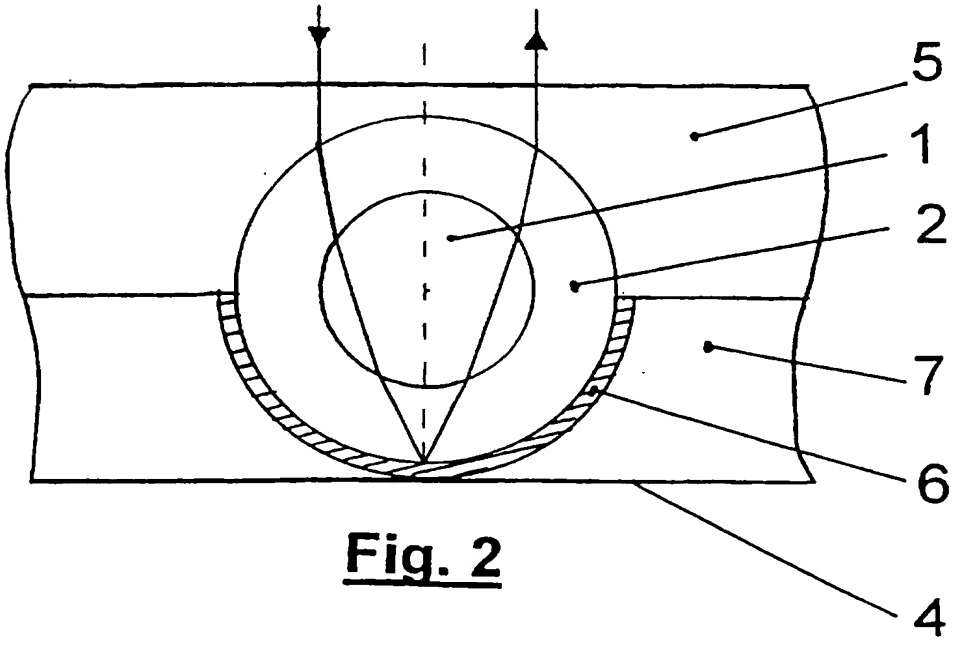


Fig. 2

INTERNATIONAL SEARCH REPORT
Information on [redacted]t family members

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Inte[redacted]nal application No.
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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